| Notice of Allowability | Application No. | Applicant(s) |
|---|---|---|
| | 09/128,304 | WILLIS ET AL. |
| | Examin r | Art Unit |
| | Eleni Mantis Mercader | 3737 |

***-- The MAILING DATE of this communication appears on the cover sh et with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *interview negotiations ending on 01/05/2005*.

2. ☒ The allowed claim(s) is/are *1, 3-38, 40-47 and 56-58*.

3. ☐ The drawings filed on _____ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☒ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date 01072005.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *01072005*.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Eleni Mantis Mercader
Primary Examiner
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## EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Mr. Michael Bolan, Registration Number 42,339 on 01/05/05.

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3. The application has been amended as indicated below. This listing of claims replaces all prior versions and listings of claims in the application.

## MARKED-UP CLAIMS

1. (Currently Amended) A method of generating a three-dimensional graphical model of a region located within a living body, comprising the steps of:

(a) generating a three-dimensional model of a region of interest;

(b) determining ~~the~~ a three-dimensional location of a physical characteristic in a portion of the region of interest using at least one roving probe positioned within the living body;

(c) deforming the model to at least approximately incorporate the physical characteristic at the determined three-dimensional location of the physical characteristic; ~~and~~

(d) displaying the model on a graphical display; and

(e) repeating steps (b) through (d) multiple times for different probe locations to increase the conformity of the model to the region of interest.

2. (Cancelled)

3. (Currently Amended) The method of claim 1 further including the step of (e) determining ~~the~~ a relative three-dimensional location of a medical device positioned in the region of interest ~~in the living body~~ and graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

4. (Original) The method of claim 3 wherein the medical device is the at least one probe.

5. (Currently Amended) The method of claim 3 wherein:

the medical device includes at least one mapping electrode;

step (e) includes determining ~~the~~ a relative three-dimensional location of the at least one mapping electrode; and

the method further includes the steps of:

(f) detecting electrical activity using the at least one mapping electrode; and

(g) generating a map of the detected electrical activity and superimposing the map on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one mapping electrode.

6. (Currently Amended) The method of claim 3 wherein:

the medical device includes at least one ablation electrode;

step (e) includes determining ~~the~~ a relative three-dimensional location of the at least one ablation electrode; and

the method further includes the steps of:

(f) forming a lesion using the at least one ablation electrode; and

(g) generating a visual representation of the lesion and superimposing the visual representation on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one ablation electrode.

7. (Currently Amended) The method of claim 1 wherein the model generated in step (a) includes an anatomical ~~features~~ feature known to exist in the ~~actual~~ region of interest, wherein the physical ~~characteristics~~ characteristic ~~include~~ is the anatomical ~~features~~ feature~~, and wherein step (c) includes deforming the model to correlate at least a portion of the anatomical features on the model with the determined three-dimensional locations of corresponding anatomical features in the living body~~.

8. (Currently Amended) The method of claim 7 wherein step (c) includes scaling the model to correlate ~~at least a portion of the~~ a corresponding anatomical ~~features~~ feature on the model with the determined three-dimensional ~~locations~~ location of the ~~corresponding~~ anatomical ~~features~~ feature ~~in the living body~~.

9. (Currently Amended) The method of claim 7 wherein step (c) includes orienting the model to correlate ~~at least a portion of the~~ a corresponding anatomical ~~features~~ feature on the model with the determined three-dimensional ~~locations~~ location of the ~~corresponding~~ anatomical ~~features~~ feature ~~in the living body~~.

10. (Original) The method of claim 7 wherein step (c) includes performing a rigid body transformation.

11. (Original) The method of claim 10 wherein the rigid body transformation uses a procrustean algorithm.

12. (Original) The method of claim 1 wherein step (c) includes performing vector field interpolation on the model.

13. (Original) The method of claim 1 wherein the region of interest is an organ.

14. (Original) The method of claim 13 wherein the organ is a heart.

15. (Currently Amended) A method of generating a three-dimensional graphical model of an organ located within a living body, comprising the steps of

(a) generating a three-dimensional model of at least a portion of ~~an~~ the organ~~, the model including a plurality of anatomical features corresponding to anatomical features in the organ~~;

(b) ~~obtaining the~~ determining a relative three-dimensional ~~locations~~ location of a known anatomical ~~features~~ feature in the organ using a ~~reference~~ first probe positioned in the organ;

(c) deforming the model ~~using the determined relative three-dimensional locations of the anatomical features in the organ~~ to approximately correlate ~~the~~ a three-dimensional ~~locations~~ location of ~~the~~ a corresponding anatomical ~~features~~ feature on the model to the determined ~~locations~~ location of ~~corresponding~~ the known anatomical ~~features~~ feature in the organ; ~~and~~

(d) graphically displaying the model;

(e) determining a relative three-dimensional location of an additional physical characteristic in the organ using at least one roving probe positioned in the organ; and

(f) further deforming the model to approximately incorporate the additional physical characteristic.

16. (Currently Amended) The method of claim 15 ~~further including the steps of:~~

~~(e) obtaining the relative three-dimensional location of an additional physical characteristic in the organ using at least one probe positioned in the organ; and~~

~~(f) further deforming the model to approximately incorporate at least a portion of the additional physical characteristic~~ wherein the first probe and the at least one roving probe are the same probe.

17. (Currently Amended) The method of claim ~~16~~ 15 further including repeating steps (e) and (f) multiple times for different roving probe locations to increase the conformity of the model to the organ.

18. (Currently Amended) The method of claim 17 wherein the repeating step includes repositioning the at least one roving probe multiple times within the organ.

19. (Currently Amended) The method of claim 15 further including the step of determining ~~the~~ a relative three-dimensional location of a medical device positioned in the organ and graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

20. (Currently Amended) The method of claim 19 wherein the medical device is the at least one roving probe.

21. (Currently Amended) The method of claim 15 wherein the ~~reference~~ first probe includes a plurality of ultrasonic transducers thereon, and wherein~~:~~ step (b) includes the steps of using ultrasound triangulation techniques to determine the three-dimensional locations of the ultrasonic transducers, and deriving the relative three-dimensional ~~locations~~ location of the anatomical ~~features~~ feature using the relative three-dimensional locations of the ultrasonic transducers.

22. (Currently Amended) The method of claim 21 ~~further including the steps of:~~

~~(e) providing an additional probe having at least one ultrasonic transducer thereon;~~

~~(f) positioning the additional probe in the organ;~~

~~(g) determining the three-dimensional location of the at least one ultrasonic transducer using ultrasound triangulation techniques;~~

~~(h) deriving the relative three-dimensional locations of an the additional physical characteristic in the organ using the determined three-dimensional locations of the ultrasound transducers; and~~

~~(i) further deforming the model to approximately incorporate at least a portion of the additional physical characteristic~~ wherein the at least one roving probe includes a plurality of ultrasonic transducers thereon, and wherein step (e) includes the steps of using ultrasound triangulation techniques to determine the three-dimensional locations of the ultrasonic transducers, and deriving the relative three-dimensional location of the physical characteristic using the relative three-dimensional locations of the ultrasonic transducers.

23. (Currently Amended) A method of generating a three-dimensional graphical model of a heart located within a living body, comprising the steps of:

(a) generating a three-dimensional model of the heart~~, the model including a plurality of anatomical features corresponding to known anatomical features of hearts~~;

(b) ~~obtaining the~~ determining a relative three-dimensional ~~locations~~ location of a known anatomical ~~features~~ feature in a portion of the heart using a reference catheter positioned in the heart;

(c) deforming the model ~~using the determined relative three-dimensional locations location of the anatomical features in the organ~~ to approximately correlate ~~the~~ a three-

dimensional ~~locations~~ location of ~~the~~ an anatomical ~~features~~ feature on the model to the determined ~~locations~~ location of the corresponding anatomical ~~features~~ feature in the heart;

(d) positioning an additional roving probe in a chamber of the heart;

(e) ~~obtaining the~~ determining a relative three-dimensional location of a physical characteristic in the chamber using the additional roving probe;

(f) performing another transformation on the model to approximately incorporate at least a portion of the physical characteristic; and

(g) graphically displaying the model.

24. (Currently Amended) The method of claim 23 further comprising the step of repositioning the additional roving probe and repeating steps (e) and (f) multiple times to increase the conformity of the model to the heart.

25. (Currently Amended) The method of claim 23 further including the steps of:

(h) providing a medical device having at least one electrode;

(i) positioning the medical device in the chamber; and

(j) determining ~~the~~ a relative three-dimensional location of the at least one electrode and graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

26. (Currently Amended) The method of claim 25 wherein the medical device is the at least one roving probe.

27. (Currently Amended) The method of claim 23 further comprising the steps of:

(h) providing a medical device having at least one mapping electrode;

(i) positioning the medical device in the chamber;

(j) determining ~~the~~ a relative three-dimensional location of the at least one mapping electrode;

(k) detecting electrical activity using the at least one mapping electrode; and

~~(i)~~ (l) generating a map of the detected electrical activity and superimposing the map on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one electrode.

28. (Currently Amended) The method of claim 27 wherein the medical device includes a plurality of mapping electrodes, wherein steps (j) through ~~(i)~~ (l) are carried out using the plurality of mapping electrodes, and wherein the map generated in step ~~(i)~~ (l) is an isochronal map.

29. (Currently Amended) The method of claim 27 wherein the medical device includes a plurality of mapping electrodes, wherein steps (j) through (l) are carried out using the plurality of mapping electrodes, and wherein the map generated in step ~~(i)~~ (l) is an isopotential map.

30. (Currently Amended) The method of claim 23 further including the steps of:

(h) providing a medical device having at least one ablation electrode;

(i) positioning the medical device in the chamber;

(j) determining ~~the~~ a relative three-dimensional location of the at least one ablation electrode;

(k) forming a lesion using the at least one ablation electrode; and

(l) generating a visual representation of the lesion and superimposing the visual representation on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one ablation electrode.

31. (Currently Amended) A system for generating a three-dimensional graphical model of a region located within a living body, comprising:

a graphical display;

display software for generating a model of a region of interest and for displaying the model on the graphical display;

a roving probe positionable with a region in a living body corresponding to the region of interest;

a localization system for determining ~~the~~ three-dimensional locations of at least a portion of the roving probe ~~when~~ as the roving probe is ~~positioned~~ moved within ~~a~~ the living body, and for deriving ~~the~~ three-dimensional locations of ~~a~~ physical characteristics in portions of the region of interest from the determined three-dimensional locations of the roving probe; and

transformation software for deforming the model to at least approximately incorporate ~~the~~ each physical characteristic at the determined three-dimensional location as each three-dimensional location of the roving probe is derived, wherein the conformity of the model to the region of interest within the living body is increased.

32. (Currently Amended) The system of claim 31 wherein:

the system further includes a medical device positionable in the region of interest;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the medical device when it is positioned in the region of interest in the living body; and

the display software is further for graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

33. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one electrode when it is positioned in the region of interest ~~in the living body~~; and

the display software is for graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

34. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one mapping electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one mapping electrode when it is positioned in the region of interest ~~in the living body~~;

the system further includes an electrophysiology system for receiving detected electrical activity from the at least one mapping electrode and for generating a map of the electrical activity; and

the display software is for graphically representing the map superimposed on the model at the three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

35. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one ablation electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one ablation electrode when it is positioned in the region of interest ~~in the living body~~;

the system further includes an ablation system for delivering ablation energy to the at least one ablation electrode; and

the display software is for generating a visual representation of an ablation lesion and for superimposing the visual representation of the lesion on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

36. (Original) The system of claim 31 wherein the display software is for generating and displaying a model of an organ.

37. (Original) The system of claim 36 wherein the organ is a heart.

38. (Currently Amended) A system for generating a three-dimensional graphical model of an organ located within a living body, comprising:

a graphical display;

display software for generating a model of an organ and for displaying the model on the graphical display~~, the model including a plurality of anatomical features corresponding to anatomical features in the organ~~;

a reference probe positionable within or in proximity to an anatomical feature of the organ ~~in a living body~~;

an additional roving probe positionable within or in proximity to an additional physical characteristic of the organ;

a localization system for determining ~~the~~ a three-dimensional location of at least a portion of the reference probe when the reference probe is positioned within or in proximity to the ~~organ~~ anatomical feature, ~~and~~ for deriving ~~the~~ a three-dimensional ~~locations~~ location of the anatomical ~~features~~ feature in the organ from the determined three-dimensional location of the reference

probe, for determining a three-dimensional location of at least a portion of the additional roving probe when the additional roving probe is positioned within or in proximity to the additional physical characteristic, and for deriving a three-dimensional location of the additional physical characteristic in the organ from the determined three-dimensional location of the additional roving probe ; and

transformation software for deforming the model to at least approximately correlate the respective three-dimensional locations of the anatomical ~~features~~ feature and additional physical characteristic on the model to the determined locations of ~~corresponding~~ the anatomical ~~features~~ feature and additional physical characteristic in the organ.

39. (Cancelled)

40. (Currently Amended) The system of claim ~~39~~ 38 wherein:

the additional roving probe is moveable to multiple locations within the organ;

the localization system is further for deriving ~~the~~ locations of multiple physical characteristics within the organ from each of ~~the~~ multiple locations of the additional roving probe; and

the transformation software is further for deforming the model to approximately incorporate the multiple physical characteristics to increase the conformity between the model and the organ.

41. (Original) The system of claim 38 wherein the organ is a heart.

42. (Currently Amended) The system of claim 41 wherein:

the system further includes a medical device positionable in the heart;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the medical device when it is positioned in the heart; and

the display software is further for graphically representing at least a portion the medical device superimposed on the model at the determined three-dimensional location of the medical device.

43. (Currently Amended) The system of claim 42 wherein:

the medical device includes at least one electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one electrode when it is positioned in the heart; and

the display software is for graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

44. (Currently Amended) The system of claim 42 wherein

the medical device includes at least one mapping electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one mapping electrode when it is positioned in the heart;

the system further includes an electrophysiology system for receiving detected electrical activity from the at least one mapping electrode and for generating a map of electrical activity within the heart; and

the display software is further for superimposing the map on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

45. (Currently Amended) The system of claim 42 wherein:

the medical device includes at least one ablation electrode;

the localization system is further for determining ~~the~~ a relative three-dimensional location of the at least one ablation electrode when it is positioned in the heart;

the system further includes an ablation system for delivering ablation energy to the at least one ablation electrode to create a lesion in the heart; and

the display software is further for generating a visual representation of an ablation lesion and for superimposing the visual representation on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

46. (Original) The system of claim 44 wherein the medical device includes a plurality of mapping electrodes, wherein the electrophysiology system is for generating an isochronal map, and wherein the display software is for superimposing the map on the model.

47. (Original) The system of claim 44 wherein the medical device includes a plurality of mapping electrodes, wherein the electrophysiology system is for generating an isopotential map, and wherein the display software is for superimposing the map on the model.

48-55. (Cancelled)

56. (Currently Amended) A system for graphically displaying and dynamically correcting a model of an organ comprising:

a processor for generating a model of an organ;

a display for displaying the generated model;

a roving catheter for placement into the body adjacent the organ; and

means associated with the catheter for generating data related to ~~the~~ a position of the roving catheter and wherein said processor utilizes said position data to deform the displayed model of the organ as each roving catheter position is generated, wherein the conformity of the model to a corresponding actual region of interest within the living body is increased.

57. (Currently Amended) ~~A system as recited in~~ The system of claim 56 further including means for obtaining a fluoroscopic image of the organ and the roving catheter further including a means for inputting information related to ~~the~~ a location of the roving catheter obtained from the fluoroscopic image into the processor to further deform the displayed model of the organ.

58. (Currently Amended) ~~A system as recited in~~ The system of claim 56 wherein the system further includes a plurality of ultrasonic transducers positionable within the living body, at least one of the transducers being on the roving catheter, and wherein the means associated with the roving catheter includes:

localization hardware electronically coupled to the transducers for causing the ultrasound transducers to transmit and/or receive ultrasound signals and for measuring the elapsed time between transmission of ultrasound signals by transmitting transducers and receipt of the signals by receiving transducers;

processor means electronically coupled to the localization hardware for calculating the distances between the transducers using the measured elapsed time, for determining the ~~three-dimensional location~~ position of the roving catheter~~, and for deriving the location of the organ from the three dimensional location of the catheter~~.

59-60. (Cancelled).

## CLEAN COPY OF AMENDED CLAIMS

1. (Currently Amended) A method of generating a three-dimensional graphical model of a region located within a living body, comprising the steps of:

(a) generating a three-dimensional model of a region of interest;

(b) determining a three-dimensional location of a physical characteristic in a portion of the region of interest using at least one roving probe positioned within the living body;

(c) deforming the model to at least approximately incorporate the physical characteristic at the determined three-dimensional location of the physical characteristic;

(d) displaying the model on a graphical display; and

(e) repeating steps (b) through (d) multiple times for different roving probe locations to increase the conformity of the model to the region of interest.

2. (Cancelled)

3. (Currently Amended) The method of claim 1 further including the step of (e) determining a relative three-dimensional location of a medical device positioned in the region of interest and graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

4. (Original) The method of claim 3 wherein the medical device is the at least one probe.

5. (Currently Amended) The method of claim 3 wherein:

the medical device includes at least one mapping electrode;

step (e) includes determining a relative three-dimensional location of the at least one mapping electrode; and

the method further includes the steps of:

(f) detecting electrical activity using the at least one mapping electrode; and

(g) generating a map of the detected electrical activity and superimposing the map on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one mapping electrode.

6. (Currently Amended) The method of claim 3 wherein:

the medical device includes at least one ablation electrode;

step (e) includes determining a relative three-dimensional location of the at least one ablation electrode; and

the method further includes the steps of:

(f) forming a lesion using the at least one ablation electrode; and

(g) generating a visual representation of the lesion and superimposing the visual representation on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one ablation electrode.

7. (Currently Amended) The method of claim 1 wherein the model generated in step (a) includes an anatomical feature known to exist in the region of interest, wherein the physical characteristic is the anatomical feature.

8. (Currently Amended) The method of claim 7 wherein step (c) includes scaling the model to correlate a corresponding anatomical feature on the model with the determined three-dimensional location of the anatomical feature.

9. (Currently Amended) The method of claim 7 wherein step (c) includes orienting the model to correlate a corresponding anatomical feature on the model with the determined three-dimensional location of the anatomical feature.

10. (Original) The method of claim 7 wherein step (c) includes performing a rigid body transformation.

11. (Original) The method of claim 10 wherein the rigid body transformation uses a procrustean algorithm.

12. (Original) The method of claim 1 wherein step (c) includes performing vector field interpolation on the model.

13. (Original) The method of claim 1 wherein the region of interest is an organ.

14. (Original) The method of claim 13 wherein the organ is a heart.

15. (Currently Amended) A method of generating a three-dimensional graphical model of an organ located within a living body, comprising the steps of

(a) generating a three-dimensional model of at least a portion of the organ;

(b) determining a relative three-dimensional location of a known anatomical feature in the organ using a first probe positioned in the organ;

(c) deforming the model to approximately correlate a three-dimensional location of a corresponding anatomical feature on the model to the determined location of the known anatomical feature in the organ;

(d) graphically displaying the model;

(e) determining a relative three-dimensional location of an additional physical characteristic in the organ using at least one roving probe positioned in the organ; and

(f) further deforming the model to approximately incorporate the additional physical characteristic.

16. (Currently Amended) The method of claim 15 wherein the first probe and the at least one roving probe are the same probe.

17. (Currently Amended) The method of claim 15 further including repeating steps (e) and (f) multiple times for different roving probe locations to increase the conformity of the model to the organ.

18. (Currently Amended) The method of claim 17 wherein the repeating step includes repositioning the at least one roving probe multiple times within the organ.

19. (Currently Amended) The method of claim 15 further including the step of determining a relative three-dimensional location of a medical device positioned in the organ and graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

20. (Currently Amended) The method of claim 19 wherein the medical device is the at least one roving probe.

21. (Currently Amended) The method of claim 15 wherein the first probe includes a plurality of ultrasonic transducers thereon, and wherein step (b) includes the steps of using ultrasound triangulation techniques to determine the three-dimensional locations of the ultrasonic transducers, and deriving the relative three-dimensional location of the anatomical feature using the relative three-dimensional locations of the ultrasonic transducers.

22. (Currently Amended) The method of claim 21 wherein the at least one roving probe includes a plurality of ultrasonic transducers thereon, and wherein step (e) includes the steps of using ultrasound triangulation techniques to determine the three-dimensional locations of the

ultrasonic transducers, and deriving the relative three-dimensional location of the physical characteristic using the relative three-dimensional locations of the ultrasonic transducers.

23. (Currently Amended) A method of generating a three-dimensional graphical model of a heart located within a living body, comprising the steps of:

(a) generating a three-dimensional model of the heart;

(b) determining a relative three-dimensional location of a known anatomical feature in a portion of the heart using a reference catheter positioned in the heart;

(c) deforming the model to approximately correlate a three-dimensional location of an anatomical feature on the model to the determined location of the corresponding anatomical feature in the heart;

(d) positioning an additional roving probe in a chamber of the heart;

(e) determining relative three-dimensional location of a physical characteristic in the chamber using the additional roving probe;

(f) performing another transformation on the model to approximately incorporate at least a portion of the physical characteristic; and

(g) graphically displaying the model.

24. (Currently Amended) The method of claim 23 further comprising the step of repositioning the additional roving probe and repeating steps (e) and (f) multiple times to increase the conformity of the model to the heart.

25. (Currently Amended) The method of claim 23 further including the steps of:

(h) providing a medical device having at least one electrode;

(i) positioning the medical device in the chamber; and

(j) determining a relative three-dimensional location of the at least one electrode and graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

26. (Currently Amended) The method of claim 25 wherein the medical device is the at least one roving probe.

27. (Currently Amended) The method of claim 23 further comprising the steps of:

(h) providing a medical device having at least one mapping electrode;

(i) positioning the medical device in the chamber;

(j) determining a relative three-dimensional location of the at least one mapping electrode;

(k) detecting electrical activity using the at least one mapping electrode; and

(l) generating a map of the detected electrical activity and superimposing the map on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one electrode.

28. (Currently Amended) The method of claim 27 wherein the medical device includes a plurality of mapping electrodes, wherein steps (j) through (l) are carried out using the plurality of mapping electrodes, and wherein the map generated in step (l) is an isochronal map.

29. (Currently Amended) The method of claim 27 wherein the medical device includes a plurality of mapping electrodes, wherein steps (j) through (l) are carried out using the plurality of mapping electrodes, and wherein the map generated in step (l) is an isopotential map.

30. (Currently Amended) The method of claim 23 further including the steps of:

(h) providing a medical device having at least one ablation electrode;

(i) positioning the medical device in the chamber;

(j) determining a relative three-dimensional location of the at least one ablation electrode;

(k) forming a lesion using the at least one ablation electrode; and

(l) generating a visual representation of the lesion and superimposing the visual representation on the model at a three-dimensional location corresponding to the determined three-dimensional location of the at least one ablation electrode.

31. (Currently Amended) A system for generating a three-dimensional graphical model of a region located within a living body, comprising:

a graphical display;

display software for generating a model of a region of interest and for displaying the model on the graphical display;

a roving probe positionable with a region in a living body corresponding to the region of interest;

a localization system for determining three-dimensional locations of at least a portion of the roving probe as the roving probe is moved within the living body, and for deriving three-dimensional locations of physical characteristics in portions of the region of interest from the determined three-dimensional locations of the roving probe; and

transformation software for deforming the model to at least approximately incorporate each physical characteristic at the determined three-dimensional location as each three-dimensional location of the roving probe is derived, wherein the conformity of the model to the region of interest within the living body is increased.

32. (Currently Amended) The system of claim 31 wherein:

the system further includes a medical device positionable in the region of interest;

the localization system is further for determining a relative three-dimensional location of the medical device when it is positioned in the region of interest; and

the display software is further for graphically representing the medical device superimposed on the model at the determined three-dimensional location of the medical device.

33. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one electrode;

the localization system is further for determining a relative three-dimensional location of the at least one electrode when it is positioned in the region of interest; and

the display software is for graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

34. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one mapping electrode;

the localization system is further for determining a relative three-dimensional location of the at least one mapping electrode when it is positioned in the region of interest;

the system further includes an electrophysiology system for receiving detected electrical activity from the at least one mapping electrode and for generating a map of the electrical activity; and

the display software is for graphically representing the map superimposed on the model at the three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

35. (Currently Amended) The system of claim 32 wherein:

the medical device includes at least one ablation electrode;

the localization system is further for determining a relative three-dimensional location of the at least one ablation electrode when it is positioned in the region of interest;

the system further includes an ablation system for delivering ablation energy to the at least one ablation electrode; and

the display software is for generating a visual representation of an ablation lesion and for superimposing the visual representation of the lesion on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

36. (Original) The system of claim 31 wherein the display software is for generating and displaying a model of an organ.

37. (Original) The system of claim 36 wherein the organ is a heart.

38. (Currently Amended) A system for generating a three-dimensional graphical model of an organ located within a living body, comprising:

a graphical display;

display software for generating a model of an organ and for displaying the model on the graphical display;

a reference probe positionable within or in proximity to an anatomical feature of the organ;

an additional roving probe positionable within or in proximity to an additional physical characteristic of the organ;

a localization system for determining a three-dimensional location of at least a portion of the reference probe when the reference probe is positioned within or in proximity to the anatomical feature, for deriving a three-dimensional location of the anatomical feature in the organ from the determined three-dimensional location of the reference probe, for determining a three-dimensional location of at least a portion of the additional roving probe when the additional roving probe is positioned within or in proximity to the additional physical characteristic, and for deriving a three-dimensional location of the additional physical characteristic in the organ from the determined three-dimensional location of the additional roving probe; and

transformation software for deforming the model to at least approximately correlate the respective three-dimensional locations of the anatomical feature and additional physical characteristic on the model to the determined locations of the anatomical feature and additional physical characteristic in the organ.

39. (Cancelled)

40. (Currently Amended) The system of claim 38 wherein:

the additional roving probe is moveable to multiple locations within the organ;

the localization system is further for deriving locations of multiple physical characteristics within the organ from each of multiple locations of the additional roving probe; and

the transformation software is further for deforming the model to approximately incorporate the multiple physical characteristics to increase the conformity between the model and the organ.

41. (Original) The system of claim 38 wherein the organ is a heart.

42. (Currently Amended) The system of claim 41 wherein:

the system further includes a medical device positionable in the heart;

the localization system is further for determining a relative three-dimensional location of the medical device when it is positioned in the heart; and

the display software is further for graphically representing at least a portion the medical device superimposed on the model at the determined three-dimensional location of the medical device.

43. (Currently Amended) The system of claim 42 wherein:

the medical device includes at least one electrode;

the localization system is further for determining a relative three-dimensional location of the at least one electrode when it is positioned in the heart; and

the display software is for graphically representing the at least one electrode superimposed on the model at the determined three-dimensional location of the at least one electrode.

44. (Currently Amended) The system of claim 42 wherein

the medical device includes at least one mapping electrode;

the localization system is further for determining a relative three-dimensional location of the at least one mapping electrode when it is positioned in the heart;

the system further includes an electrophysiology system for receiving detected electrical activity from the at least one mapping electrode and for generating a map of electrical activity within the heart; and

the display software is further for superimposing the map on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

45. (Currently Amended) The system of claim 42 wherein:

the medical device includes at least one ablation electrode;

the localization system is further for determining a relative three-dimensional location of the at least one ablation electrode when it is positioned in the heart;

the system further includes an ablation system for delivering ablation energy to the at least one ablation electrode to create a lesion in the heart; and

the display software is further for generating a visual representation of an ablation lesion and for superimposing the visual representation on the model at a three-dimensional location corresponding to the three-dimensional location of the at least one electrode.

46. (Original) The system of claim 44 wherein the medical device includes a plurality of mapping electrodes, wherein the electrophysiology system is for generating an isochronal map, and wherein the display software is for superimposing the map on the model.

47. (Original) The system of claim 44 wherein the medical device includes a plurality of mapping electrodes, wherein the electrophysiology system is for generating an isopotential map, and wherein the display software is for superimposing the map on the model.

48-55. (Cancelled)

56. (Currently Amended) A system for graphically displaying and dynamically correcting a model of an organ comprising:

a processor for generating a model of an organ;

a display for displaying the generated model;

a roving catheter for placement into the body adjacent the organ; and

means associated with the catheter for generating data related to a position of the roving catheter and wherein said processor utilizes said position data to deform the displayed model of the organ as each roving catheter position is generated, wherein the conformity of the model to a corresponding actual region of interest within the living body is increased.

57. (Currently Amended) The system of claim 56 further including means for obtaining a fluoroscopic image of the organ and the roving catheter further including a means for inputting information related to a location of the roving catheter obtained from the fluoroscopic image into the processor to further deform the displayed model of the organ.

58. (Currently Amended) The system of claim 56 wherein the system further includes a plurality of ultrasonic transducers positionable within the living body, at least one of the transducers being on the roving catheter, and wherein the means associated with the roving catheter includes:

localization hardware electronically coupled to the transducers for causing the ultrasound transducers to transmit and/or receive ultrasound signals and for measuring the elapsed time between transmission of ultrasound signals by transmitting transducers and receipt of the signals by receiving transducers;

processor means electronically coupled to the localization hardware for calculating the distances between the transducers using the measured elapsed time, for determining the position of the roving catheter.

59-60. (Cancelled).

4. The following changes to the drawings have been approved by the examiner and agreed upon by applicant: Formal drawings are now required and will be submitted. In order to avoid abandonment of the application, applicant must make these above agreed upon drawing changes.

5. The following is an examiner's statement of reasons for allowance: The prior art of record does not fairly teach or suggest a method or an apparatus having transformation software for deforming an organ model to at least approximately correlate respective three-dimensional locations of anatomical features and/or additional physical characteristics by using at least one roving probe in order to increase conformity of the model to the region of interest. See in particular drawings 40A-42 and the disclosure section regarding the three dimensional deformable model, pages 51-61.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eleni Mantis Mercader whose telephone number is (571) 272-4740. The examiner can normally be reached on Mon. - Fri., 8:00 a.m.-6:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on (571) 272-4956. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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